Volume 25 March 1939 *Number 3*

Lubrication

A Technical Publication Devoted to the Selection and Use of Lubricants

THIS ISSUE

Textile Service

Spindle Lubrication
Prevention of Stock Spoilage
Ball and Roller Bearings
Knitting Machinery

PUBLISHED BY
THE TEXAS COMPANY
TEXACO PETROLEUM PRODUCTS

TEXACO LUBRICANTS
FOR
TEXTILE MACHINERY

OPENING
PICKING
CARDING
COMBING
GILLING
SPINNING
SPOOLING
TWISTING
WINDING

BALL or ROLLER BEARINGS	
Oil Lubricated	TEXACO Cetus or Alcaid Oils
Grease Lubricated	TEXACO Starfak Greases
PLAIN or RESERVOIR BEARINGS	
Oil Lubricated	TEXACO Texol-D or Aleph Oil
Grease Lubricated	TEXACO Cup Greases
COMB BOXES	
New—tight	TEXACO Regal Oil-C or Alcaid Oil
Old—worn	TEXACO Stazons
CONDENSER TAPES and RUB APRONS	TEXACO Apron Oil-E or TEXACO Neatsfoot C mpound
DAUBING MOTION	TEXACO Stazons
BACKWASHERS	
Squeeze Rolls	TEXACO Star Grease No. 6
Dry Can	TEXACO Texol-K or TEXACO 1231 Petrolatum
GILL BOXES	
Roll Necks	TEXACO Hytex Grease No. 5 or TEXACO Star Grease No. 3
SADDLES, TOP ROLLS and STANDS	TEXACO Stazons or TEXACO Ursa Oils
SPINDLES	
According to speed, type and design	TEXACO Spindura Oil-AA or TEXACO Spindle Oils
TWISTER RINGS	
Grease Lubricated	TEXACO Summitlubes
Oil Lubricated	TEXACO Regal Oils
WINDERS	
Spindle Gear Box	TEXACO Canopus or Cetus Oils
Gear Gainer	TEXACO Regal Oils A or B
Yarn Guide Cam	TEXACO Star Greases
Worm Drives	TEXACO Pinnacle Cylinder Oil

NOTE—The above chart represents our general recommendations. For any specific type or make of machine, consult your Texaco Lubrication Engineer.

LUBRICATION

A Technical Publication Devoted to the Selection and Use of Lubricants

Published by

The Texas Company, 135 East 42nd Street, New York City

Copyright 1939 by The Texas Company

Vol. XXV March, 1939 No. 3

Change of Address: In reporting change of address kindly give both old and new addresses.

"While the contents of LUBRICATION are copyrighted, other publications will be granted permission to reprint on request, provided article is quoted exactly and credit given to THE TEXAS COMPANY."

Textile Spindle Oils

THE most dependable spindle oil should be a closely fractionated "heart cut" distilled oil, light pale in color; possessed of exceptional resistance to vaporization, oxidation and viscosity increase in service.

It is interesting to analyze this statement. Naturally, the mill man is unfamiliar with certain of the terms and certainly he should be informed if he is to select his spindle oils intelligently and obtain the full benefit of the research which has been expended in their development.

Distillation of Oil vs. The Processing of Cotton or Wool

It is interesting to compare the methods employed by the petroleum industry to segregate only the most serviceable hydrocarbons for the purpose intended, and the cotton or woolen mill in treating their selected stocks to eliminate all undesirable fibres in order to bring the aggregate to as uniform a staple length as possible. The oil man subjects his crude oil to heat to bring about distillation. Petroleum oils are composed of a large number of hydrocarbons, each of which has its own boiling range. The lighter or lower viscosity components, which are unsuited to spindle lubrication, are most volatile, so they boil or distill off first. They can be compared with the short fibres in raw cotton.

The process of distillation assures the removal of many of the impurities which are a natural part of the crude oil as it is delivered to the refinery. Some of these are mechanically entrained, others chemically. Distillation under high vacuum conditions breaks the bond between them and the vaporized or distilled products are clear and ready for additional processing.

The textile mill accomplishes a similar objective by cleaning, picking and carding of cotton to remove motes and short fibres, while wool is scoured, carded and combed to remove grease, burrs and dirt and to straighten the fibres.

Fractionation of Oils vs. Long Staple Textiles

It is practicable to compare the selection of crude oil fractions for lubricating purposes in the petroleum industry with the selection of long staple cotton or wool. In other words, a closely fractionated oil is one which is manufactured from a selected grade of crude which has been refined to produce lubricating oils of controlled characteristics. In the cotton or wool industries, in turn, by selecting long staple raw materials, the mill man increases the strength and durability of his yarn by reason of the length of the fibres.

The "Heart Cut"

The term "heart cut" in the petroleum industry applies to the isolation of the fractions which are best suited to the service the finished oil is to perform. A "heart cut" spindle oil is, therefore, the best which can be refined from the crude, within the required viscosity range.

The Value of Color

Color is a visual measure of refinement to both the petroleum and textile industries. In neither case, however, does it assure of adapt-

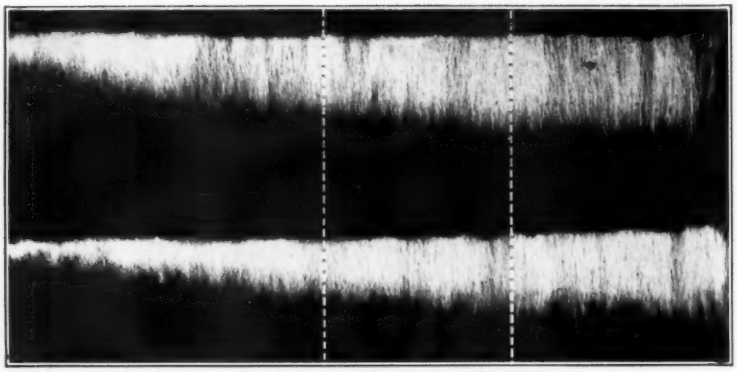


Fig. 1—Showing the average length of cotton fibres (between dotted lines).

ability of the finished product for a specific use.

The color of refined petroleum lubricating oils may vary all the way from a virtual water-white to a deep red or green. Spindle oils are usually of a pale straw hue, although this is by no means a measure of the lubricating qualities. Long staple raw cotton, in turn, is of a grayish color, yet upon the removal of undesirables as it is processed it becomes whiter; in final finishing it must be brought to a full bleach. In other words, with either, the lighter the color the better the possibility of absence of undesirable foreign material. Here again, however, the color has no bearing upon the ultimate usage.

The color of a petroleum distillate is also to some extent indicative of the viscosity; lighter bodied oils are more nearly of the yellow-straw tinge; the heavier the body, the darker the oil for the same degree of refinement. So, as would be expected, spindle oils have a natural color which is distinctive.

Color is a function of the refining process in the petroleum industry, and of the bleaching process in the textile mill. The refining as well as the bleaching process requires the use of certain chemicals, in the application of which the methods are strangely analogous.

Chemical Processing

One of these analogies is the treatment of both lubricating oils and cotton goods with caustic. In the case of lubricating oil, caustic removes undesirable non-lubricating materials from the oil; in the case of cotton, caustic removes the natural waxes which are undesirable in the finished cotton fabric.

Sulfur dioxide is another chemical which is used by both industries. The petroleum chemist may apply it in liquid form as a solvent for the purpose of removing gum-forming (readily oxidizable) components from certain types of lubricating oils in order to improve their stability. In textile finishing, sulfur dioxide gas in water solution (known as sulfurous acid) is used to remove those components which impart the gray color. In both cases the product is washed and thoroughly neutralized until all acid-forming matter is removed. This is as important in the petroleum industry as in the finishing of textile fabrics.

So these oddly comparable industries have developed ways and means which are surprisingly parallel for the preparation of their finished materials.

The textile plant executive should be especially interested in the refinery procedure applied to his spindle oils; that resistance to vaporization and increase in viscosity is controlled by our processes of selection, distillation and fractionation; and that resistance to oxidation is controlled by the subsequent chemical treatment.

To Sum Up

A. "Heart cut" and fractionation to the petroleum industry are comparable to average staple length in textiles.

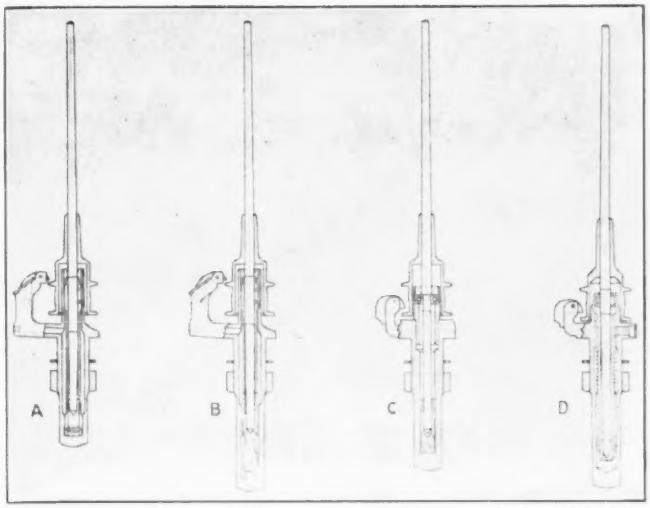
B. Non-lubricating material in an oil is the same as "motes," short fibres and undesirables in cotton or wool.

C. Uniform color control holds true for each industry.

D. Stability control of a lubricating oil can be considered by the textile industry as being comparable to the neutralization of their fabrics after bleaching, as in both cases acid-forming properties are completely removed.

Courtesy of SKF Industries, Inc.

Fig. 2—Details of the SKF roller bearing spindle.



Courtesy of Whitin Machine Works

Fig. 3—A series of Whitin spindle designs showing at A—The McMullan Bolster; B—The Whitin gravity type; C—A ball bearing design; and D—The Whitin type with SKF roller bearing bolster.

HOW A SPINDLE OIL MUST FUNCTION

When reduction in power consumption was of chief concern in spindle operation, spindle oils were selected primarily to reduce friction; in other words, on a viscosity basis. Today, however, with the trend towards higher speeds and heavier packages the oil must serve as a shock-absorbing element to prevent vibration or hunting, as well as an effective lubricant in the interest of preventing wear and reducing power consumption. These objectives can only be attained with an oil which resists viscosity increase, does not vaporize appreciably, and shows a negligible corrosive tendency.

One can be assured that a spindle oil will perform as above, provided it is free from those unstable hydrocarbon constituents which are the basic cause of corrosive gums. Continued service under oxidizing conditions, i.e., where air is entrained, accelerates the formation of such gums in poorly refined or carelessly selected oils; at the same time, vaporization of their more volatile components occurs which causes the viscosity to increase. It is obvious how this vicious cycle will lead to increased friction, abnormal power consumption and excessive spindle wear. Ultimately the only recourse is to thoroughly clean the oil ports, reservoirs and bases to remove these non-lubricating deposits.

Fortunately, modern methods of petroleum refining, by anticipating these difficulties, remove these readily oxidized materials by chemical treatment, whereby they are absorbed and removed before the finished spindle oil is released for service. So we eliminate one of the worries of the textile executive.

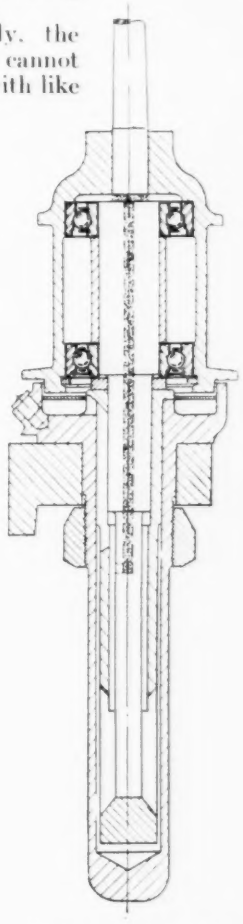
Surface Finish of Spindle Materials

The spindle designer has eliminated another worry by his studies in metallurgy, and the use of carefully selected steels for spindle construction. Today he is particularly careful to choose a grade of steel which can be very accurately machined, ground and polished. In this way, he more nearly approaches a perfect surface, which permits the use of a thinner oil film for lubrication. Thereby effecting minimum power consumption. Furthermore, by enabling the oil film to assume a more uniform degree of thickness, its cushioning or dampening effect is realized, producing less vibration.

Unfortunately, the bolster surface cannot be machined with like precision, for it is of cast iron. So the designer uses the highest grade of the latter, which, experience has proved, can be run in to a highly glazed bearing surface. This glaze is quite as important an assistant in the reduction of vibration as is the spindle surface. Hence, this polish on the bolster bearing surface must be brought about as soon as possible after the assembly is put into service.

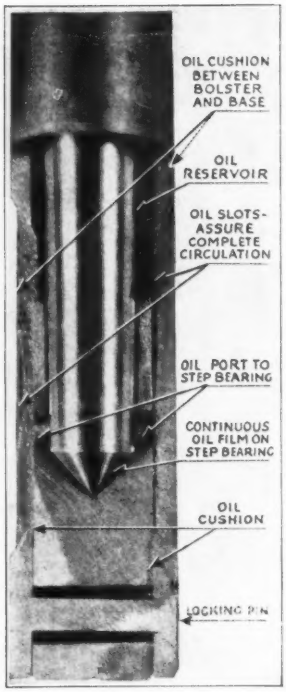
Speed Also a Factor

Spindle speeds will always have a tendency to affect vibration. There seems to be a direct relation between the two; in other words, under the high speed conditions which prevail today, vibration must be considered as a decided possibility, and, likewise, an objection. It becomes the latter because it may lead to



Courtesy of Norma-Hoffmann Bearings Corporation

Fig. 4—Details of a Norma-Hoffmann twister spindle with open separable type ball bearing at upper end, and shielded closed type below. Oil wick lubrication is employed.



Courtesy of Saco-Lowell Shops

Fig. 5—Section through a Saco-Lowell loose-locked step McMullan spindle. Note large oil capacity and provision for uniform and continuous circulation of oil.

yarn irregularity and excessive breakage. Adequate circulation of the right kind of oil has proved to be an excellent preventive. Unfortunately, however, we are restricted in volume due to the limited capacity of the spindle base. So, we rely upon the nature of the oil, its refinement and shock-absorbing characteristics. These have been perfected, along with resistance to oxidation and vaporization through long and careful research both in the laboratory and in actual mill operation.

Protection of spindle blade and bolster bearing surfaces is naturally an equally important duty which the oil must perform. In this the machine designer has cooperated with the oil industry by perfecting spindle lubricating systems to enable more thorough circulation of the oil, to reduce entry of dirt or other contaminating material and to increase the oil capacity within the limits of the machine.

Operating Influences

With an understanding of the chemical contrasts already mentioned, it is interesting to review the mechanical factors which may influence the performance of a spindle oil. Primarily it must function with a minimum of drag or friction losses. Adverse conditions will be indicated by high power consumption, by frequent end breakage and by high maintenance costs.

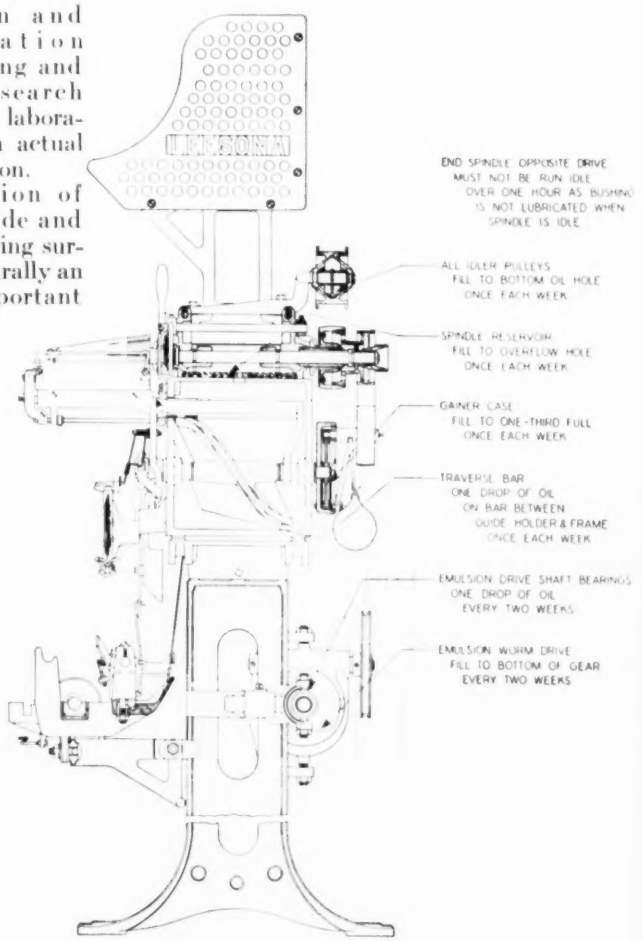
Temperature difference has proved to be a valuable indicator as to the performance of a spindle oil. Theoretically, under ideal conditions the temperature of the spindle oil in circulation should be the same as the surrounding room. Practically, there must be some difference, the oil being from 5 to 15 degrees higher. For friction can never be entirely eliminated. So, as long as we have friction we must have some temperature increase in the oil film which is transmitted to the main body of the oil. As long as this remains fairly constant we do not worry, but any marked increase should cause concern and investigation. Perhaps the oil has oxidized and sludge is interfering with free circulation, or dust and lint may have accumulated.

Friction in lubrication is well known to be of two varieties:

Solid or metallic and

Fluid or molecular

The former is controlled by the serviceability of the oil film, the latter by the nature of this film. Fluid friction in turn is dependent upon the viscosity. In other words, a heavy ad-


END SPINDLE OPPOSITE DRIVE MUST NOT BE RUN IDLE OVER ONE HOUR AS BUSHING IS NOT LUBRICATED WHEN SPINDLE IS IDLE
ALL IDLER PULLEYS FILL TO BOTTOM OIL HOLE ONCE EACH WEEK
SPINDLE RESERVOIR FILL TO OVERFLOW HOLE ONCE EACH WEEK
GAINER CASE FILL TO ONE-THIRD FULL ONCE EACH WEEK
TRAVERSE BAR ONE DROP OF OIL ON BAR BETWEEN GUIDE HOLDER & FRAME ONCE EACH WEEK
EMULSION DRIVE SHAFT BEARINGS ONE DROP OF OIL EVERY TWO WEEKS
EMULSION WORM DRIVE FILL TO BOTTOM OF GEAR EVERY TWO WEEKS

Courtesy of Universal Winding Company

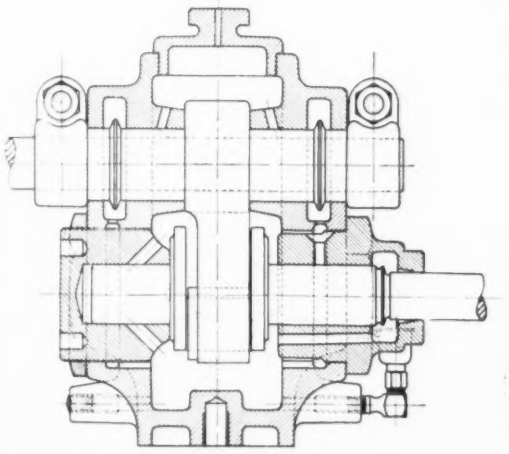
Fig. 6—Oiling diagram for the No. 50 Universal Winding Machine. A light-bodied straight mineral oil is recommended for all parts except the emulsion worm drive, which requires a steam cylinder oil.

hesive oil will show more fluid friction than a light, closely fractionated oil due to the more sluggish action of its molecules. So, heavier oils normally show a higher temperature difference.

Some textile men have taken this as the basis for materially reducing the viscosity of their spindle oils. Reduction in viscosity must never be carried to an extreme however, for there are certain intangible limits which affect the film strength and actual lubricating ability. So we must have some resistance to shear or internal friction between the molecules of any spindle oil, and hence a slight temperature difference. It is this latter which in reality signifies successful spindle lubrication. If it is within the range of 5 to 15 degrees, operations should be regarded as satisfactory. If consistently higher, there is indication that the oil is contaminated; that it is so high in viscosity as to cause sluggish flow; or so thin as to be an imperfect lubricant. All involve excessive friction which is the basic cause of the heat condition.

Prevention of Stock Spoilage

Wherever bearings on textile machinery are located close to the materials being handled there is possibility of stock spoilage from excessive lubrication. So the machinery builder



Courtesy of Whitin Machine Works

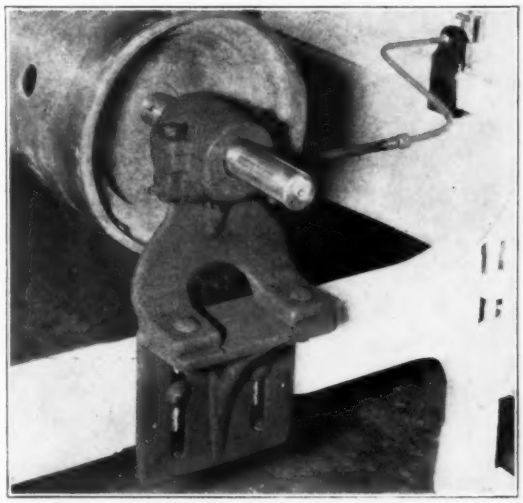
Fig. 7—Sectional view of a Whitin comb box.

today is using more and more ball or roller bearings for new equipment and replacement purposes. This is one way of reducing the necessity for frequent lubrication and the possibility of application in excess of the amount actually required. Such bearings can be sealed so that they will retain a charge of lubricant quite satisfactorily for a considerable length of time, requiring re-lubrication perhaps only three or four times a year by means of a grease specifically prepared for ball and roller bearing protection. Such an assembly is the last word in textile protection today.

There are many types of mechanisms, however, which will not permit of usage of such bearings. Twister rings, knitting machine cams and some parts of the loom are of this nature. Originally they may have been designed for oil, or it became the practice in the mill to wipe on some light grease now and then. This resulted in "creeping" and often the lubricant was blamed when it ultimately dripped off and stained the yarn or goods, whereas the method of application was more at fault.

So reduction of the tendency towards "creepage" became a research problem of the oil industry. Furthermore, the lubricant had to resist oil separation, oxidation and expansion through air entrainment.

It was found that a light grease would best meet these requirements according to machine design, operating temperatures, the condition of the mechanisms, speed, frequency of application and power consumption.



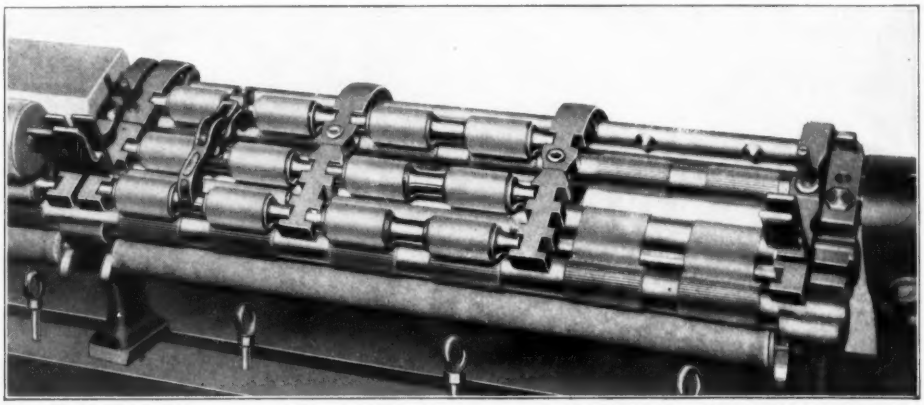
Courtesy of Whitin Machine Works

Fig. 8—Showing the Sampson bearing oiler at the side rail of a Whitin spinning frame.

On the Loom

The loom required the most careful consideration in a problem of this type. Here the lubricant must be fluid enough to permit effective

application through the spout of an ordinary squirt oil can. It must furthermore be able to withstand the shock and vibration of the weaving operation without splattering or dripping from the bearings, and it must provide full film lubrication for the entire interval between lubrication periods. Over a long period of operation it should not form gummy deposits.



Courtesy of Saco-Lowell Shops

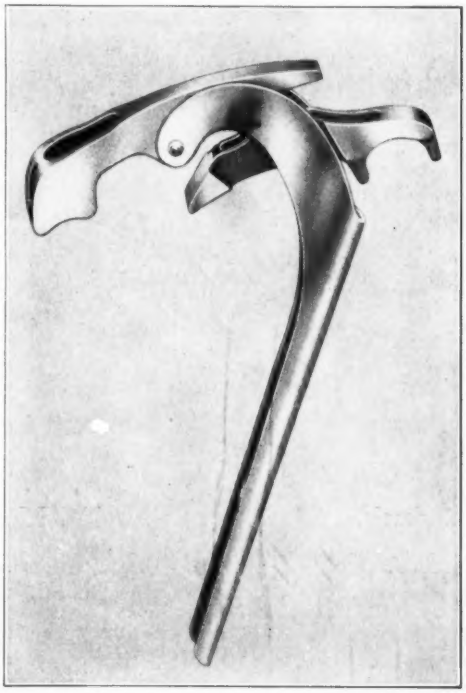
Fig. 9—Top roll assembly on a Saco-Lowell spinning frame.

It is the practice in quite a number of the mills to clean the looms periodically by blowing off the lint and shedded size compound with compressed air. If the lubricant is applied too freely, it will run out of the bearing and down the side of the frame. If the lubricant is too viscous, it will puddle in the bearing reservoir and will not feed properly through the oil ports in the bearing cap. In either event, the excess lubricant, which has become darkened through use and contaminated with metallic particles and other foreign matter will be blown onto the warp, causing oily spots in the fabric. This leads to rejection and increased production costs due to a high percentage of "seconds."

There are many different classes of looms weaving a great variety of different styles of fabrics. So the selection of one single grade of lubricant to meet the wide range of operating conditions has been found to be impossible. A series of products of similar construction but of varying viscosity or consistency is necessary.

Saddles, Top Rolls, Roll Stands, Etc.

Compared with the consumption of lubricants used for loom lubrication, the requirements of saddles, top rolls and roll stands of both the roving and spinning frames represent only a very small potential to the petroleum industry. Loom lubricants, however, are widely used for these mechanisms because operators are continually trying to keep their lubricants down to the fewest. It is necessary, therefore, to bear in mind the lubricating conditions prevailing on the roving and spinning frames when selecting any particular grade of loom lubricant for joint usage, and not just simply assume that the particular grade satisfactory for the looms will be entirely satisfactory for saddles and top rolls elsewhere in the mill.



Courtesy of Saco-Lowell Shops

Fig. 10—The Saco-Lowell unit saddle assembly. These saddles have deep oil reservoirs with wick-filled ducts leading to the roll bearings.

Selection of Proper Grade

The speeds and temperatures involved in the lubrication of saddles and top rolls present no particular problem but the design, frequency of application, method of cleaning and cleaning intervals are very pertinent factors.

There are many different types of saddles, but they can be generally classified into two groups: "wicked" and "wickless." The former contains a wicking medium which transmits the lubricant from a small reservoir (which holds only a few drops) to the bearing surface. The filtering action of such an arrangement makes it necessary to use a less viscous grade, otherwise frequent cleaning will be necessary.

The "wickless" group provides only a small oil hole in the bottom of the reservoir for the passage of the lubricant to the bearing surface, and the rate of flow is dependent entirely on the viscosity. A more viscous product is generally preferable for this class of saddle, i.e., a semi-fluid material having a viscosity of around 350 S.U.V. at 130 degrees Fahr.

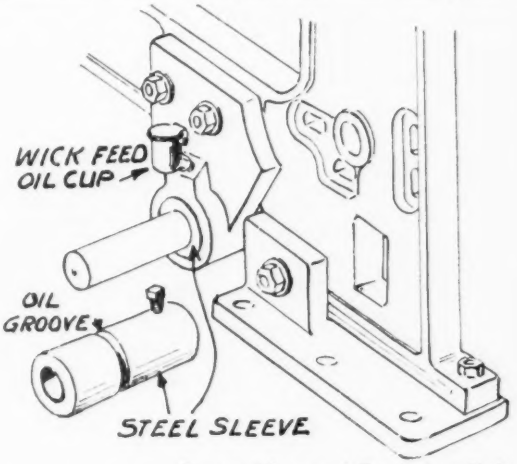
One may find both types of saddles used in the same mill, or even on the same frame, which adds all the more to the difficulty of selecting the proper lubricant. In this case it would be quite impractical to recommend two different grades, and therefore a compromise grade will have to be selected. This fact should always be realized by the purchaser, for if it is necessary to recommend a product different from that which is used on the looms, he should know that operating conditions justify this deviation.

Age and Condition of Machinery

Consideration should also be given to the age and mechanical condition of the machinery. In some instances it will be necessary for one single product to take care of old as well as new units at the same time.

The comb box of the carding machine, for instance, may become worn to the extent that straight mineral oils will be thrown out by the agitation of the submerged eccentric. These boxes operate at some thirty to forty degrees above room temperature and the eccentric speeds vary from nine to fifteen hundred revolutions per minute. Many ordinary lubricants operating under these conditions will break down.

Here is a case where it is advisable often to use one of the lighter grades of loom lubricant to avoid excessive separation and the possibility of rapid increase in operating temperatures and power consumption; also to prevent foaming. A lubricant within the 150 S.U.V. range (at 130 degrees Fahr.) is equally as well suited for application through saddle wicking mediums as it is for service on submerged eccentrics in comb boxes where heavier products would tend to break down, plug oil ports and increase operating temperatures and power consumption, all of which would accelerate wear.



Courtesy of Crompton & Knowles Loom Works

Fig. 11—The rocker shaft bearing of a Crompton & Knowles loom showing the steel sleeve which increases the bearing area and enables more positive lubrication.

Viscosity Range

The range of viscosities which are available to the textile executive to insure protection of these mechanisms with minimum spoilage is interesting. So a typical series is tabulated herewith:

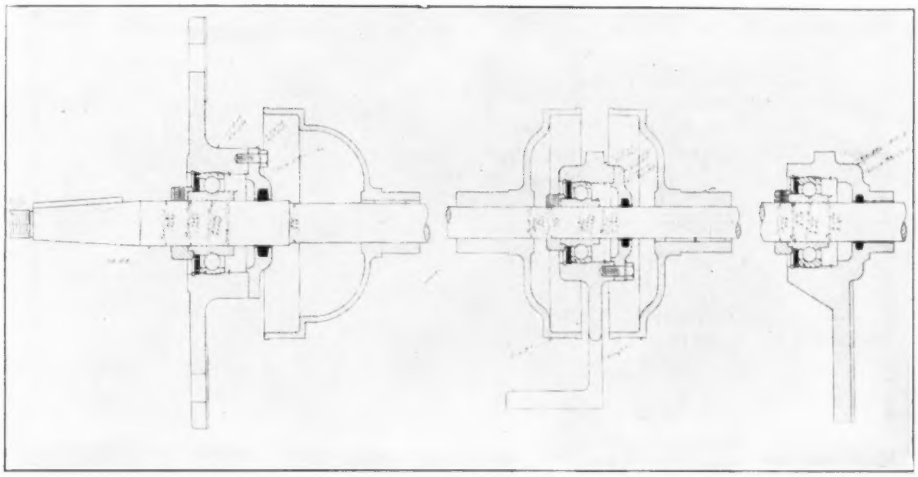
Saybolt Universal Viscosity at 130 degrees Fahr.
150
225
350
525
Semi-fluid

Grease-Lubricated Ball and Roller Bearings

Bearings of this type as used in connection with power transmission in textile machinery are prepacked or provided with means for pressure grease lubrication. Their construction also includes suitable sealing media to prevent leakage of grease and the possibility of contact with yarn or fabrics. Grease, in itself, is an effective sealing medium provided it is of a comparatively heavy body. In textile service, however, it is best to rely on mechanical means of sealing the bearings, for heavy greases are prone to lead to abnormal power

consumption. For this reason, a grease of low torque characteristics and medium consistency, which is capable of functioning under a wide temperature range has been regarded as best suited to the operating conditions.

so that operators may safely feel of them, the conclusion may often be drawn that increase in temperature is due to lack of lubrication. On the other hand, where a bearing runs warm due to too heavy a grease, addition of more



Courtesy of Whitin Machine Works and The Fafnir Bearing Co.

Fig. 12—A set of Whitin spinning frame cylinder boxes equipped with Fafnir ball bearings. The methods of sealing (in heavy black) are of interest.

Pressure Gun Operation

A most important item in the maintenance of grease-lubricated anti-friction bearings concerns the method of application, especially when relubrication is necessary. Machinery builders have largely adopted the pressure grease gun for ball and roller bearing lubrication, suitable fittings for attachment of same being located on the bearing housings or connected thereto. This method of pressure lubrication is highly efficient in protecting bearings capable of retaining a grease charge without leakage. Unfortunately, however, entirely too much grease can be forced into the bearing housing if the pressure gun is not carefully handled.

This may readily lead to overheating, especially if the grease is too heavy. Such overheating is brought about by excessive internal friction within the lubricant itself. With certain types of grease, abnormal increase in temperature may cause sufficient decrease in body to result in separation of the oil from the soap, thereby causing marked reduction in lubricating value and loss of oil by leakage if the bearing is not oil-sealed.

Don't Over-Lubricate

Where bearings of this nature are exposed

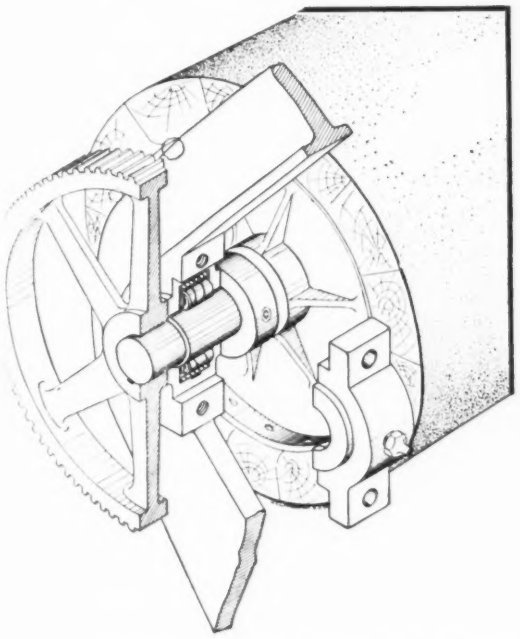
lubricant will only aggravate conditions. There will also be the danger of forcing some grease past the seals. For this reason, operators should be carefully educated in regard to the lubricating requirements of ball and roller

Courtesy of James Hunter Machine Company

Fig. 13—The new Hunter hydraulically controlled Model "G" cloth squeeze roll. This is equipped with ball bearings and fittings for grease lubrication.

bearings, just as the management should be impressed with the folly of purchasing unsuitable products, often on a price basis. It is especially necessary for the operator to remem-

ber that bearings of this type have but a limited capacity for grease. To prevent too frequent greasing, some authorities urge the use of plugs in grease holes instead of pressure



Courtesy of Hyatt Bearings Division of General Motors Corp.

Fig. 14—A Crompton & Knowles loom take-up drum with grease-lubricated Hyatt roller bearing.

gun fittings, the latter being inserted only temporarily at the regular time for re-lubrication. In this way careless or wasteful use of the grease gun is prevented.

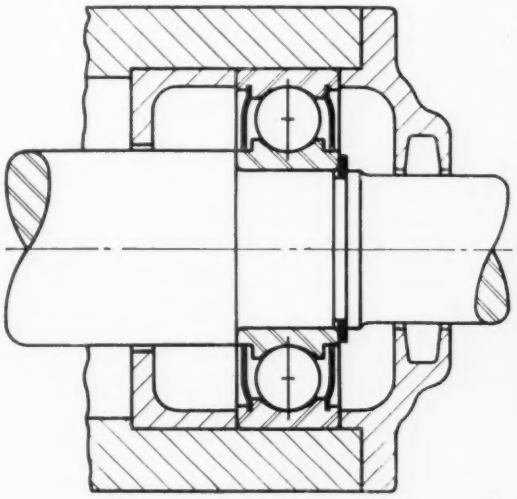
There is no direct method by which the amount of grease applied to an anti-friction bearing can be accurately controlled. Certain types of bearings, however, can be vented to reduce the possibility of imposing the full pressure of the lubricating equipment upon the seals; these latter must, of course, be maintained in suitable condition with respect to the housing if they are to positively prevent leakage of lubricant under continuous operation.

Prediction of Lubricant Performance

This is of the utmost importance to the bearing manufacturer, the lubricating engineer and the operator. The selection of greases for ball and roller bearing lubrication used to be carried out more from the viewpoint of positive lubrication than power economy. The former is, of course, highly essential, but practical research into the comparative power consumption developed by certain types of greases in a rotating ball or roller bearing has indicated some very enlightening data. It has proved the desirability of combining the art of the grease maker with that of the mechanical engineer in the interest of more careful choice of grease ingredients. This has resulted in the production of greases capable of efficiently resisting separation when subjected to violent agitation and the effect of centrifugal force, with the least expansion due to entrainment of air, and minimum torque or power consumption on starting and during operation. This latter is most desirable in textile service where several score bearings may often be involved on certain winders and spinning frames. Obviously, reduction of but a fraction of a horsepower per bearing, by use of a low-torque grease, will have a material effect upon the ultimate power consumption and the selection of the driving motor.

Good practice also requires that most careful consideration be given to designing a grease for this service which will effectively resist oxidation and gum formation and thereby relieve the bearing manufacturer of subsequent complaints due to corrosion or sticking of bearings in storage.

In other words, such a grease must be practically free from acid-forming tendencies if positive protection of the highly polished metallic surfaces of the balls, rollers and retainers is to be maintained. This necessitates a virtually neutral product and one which

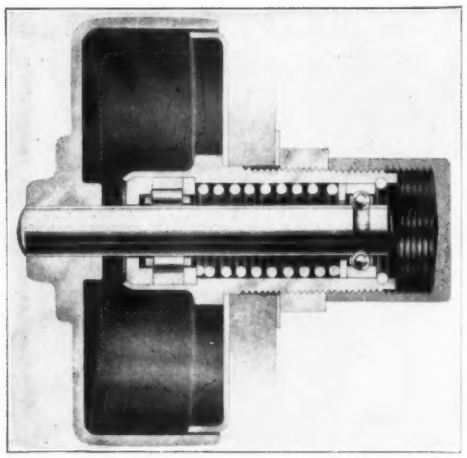


Courtesy of Marlin-Rockwell Corporation

Fig. 15—A double-shielded ball bearing which is adaptable where difficulty in re-greasing may be experienced.

contains no fillers. Any tendency towards oxidation, decomposition, separation and development of free acidity may cause corrosion or pitting of the surfaces of the rolling elements. A grease compounded from a medium viscosity,

highly refined, straight mineral oil and a soap which is suitable to comparatively high temperature service will give lowest starting and operating torque and best assurance against separation and oxidation.



Courtesy of SKF Industries, Inc.

Fig. 16—Details of the SKF spinning frame tension pulley showing ball and roller bearing application. Note sealing to protect lubrication, which is maintained by grease cup pressure.

To meet potential demands for bearing replacement in some localities, it is necessary for the manufacturer to keep a considerable stock of such bearings on hand of size and type conforming to the machinery used in each particular locality. Frequently this stock will involve many bearings which have been grease-packed at the time of manufacture. The length of time replacement bearings of this type may have to be stored may be often over a year. During this period of storage, the grease in the bearing must effectively resist chemical breakdown.

Extensive long time storage tests to determine the extent to which method of manufacture or the nature of the fatty oil used may affect such breakdowns, have been carried on by certain of the bearing manufacturers and members of the petroleum industry. These tests have proved that choice of raw materials which are highly resistant to oxidation is a most important adjunct to ultimate stability of the finished grease. Method of manufacture is also believed to be a factor, especially in regard to temperature control.

Lubrication of Knitting Machines

Lubrication plays an important part in the knitting mill, in view of the extent to which it may not only influence machinery operations and power economy, but also the effect which oil spots or stains may have upon the goods being handled.

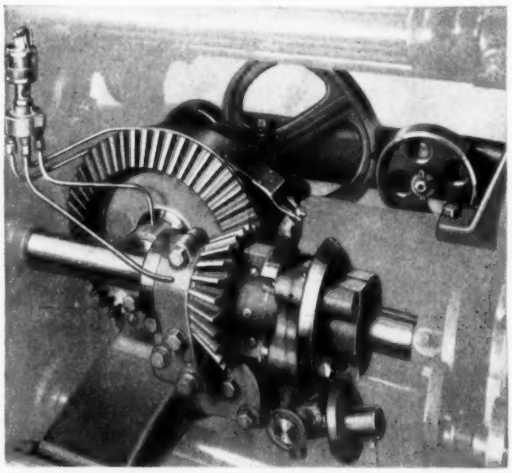
Items such as (1) power losses, (2) machine friction losses, (3) oil stained fabrics, (4) replacement losses, (5) rate of production, and (6) repair expense, therefore, markedly enter into the cost of production. In order to reduce losses, oil stains, repair expense, etc., and keep production at a maximum, the purest grades of lubricants should be used at all times.

In general, knitting machinery, whatever its type or function, can be lubricated by four grades of lubricants:

(1) A compounded stainless knitting or needle oil of about one hundred seconds Saybolt viscosity at 100 degrees Fahr., for such mechanisms as are located in close proximity to the fabric, and from which oil drips might occur to damage the latter.

(2) A compounded pale oil of around two hundred seconds viscosity, where the moisture content of the air may be abnormal.

(3) A highly refined oil of from 180 to 200 seconds viscosity for shaft bearings, cam mechanisms, roll bearings and electric motors throughout the mill.



Courtesy of Textile Machine Works

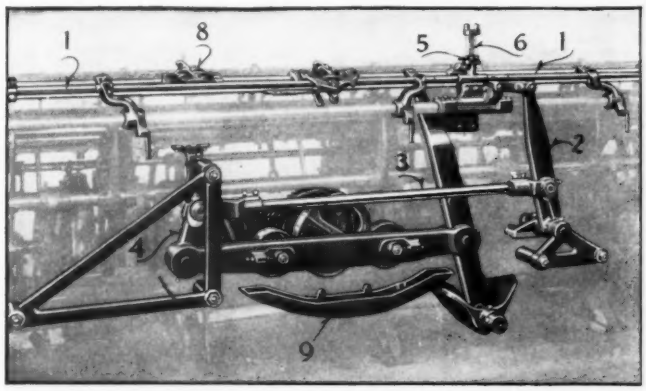
Fig. 17—Front view of a Coulier motion showing provision for visible automatic lubrication.

(4) A pure grade of light grease free from acid or alkali for anti-friction bearings and miscellaneous gears.

Warp and Full-Fashioned Machines

Warp knitting machines of the Tricot, Milanese and Raschel types will require careful lubrication of the needle, guide, sinker and presser mechanisms, etc. The same will apply to needles and sinkers of the full-fashioned machine.

The lubricant should be a high grade stainless needle oil; it must be carefully and sparingly applied to prevent access and possible damage to the fabric. The cams and other operating mechanisms, including bearing boxes, can be lubricated with a somewhat heavier specially compounded machine oil of around two hundred seconds Saybolt Viscosity at 100 degrees Fahrenheit or grease by means of a pressure gun, according to the design and age of the machine. An oil of the above nature will aid materially in eliminating that rusty oxidized appearance which is so often prevalent when ordinary oils are used. Such other operating parts as frame bearings, motors, driving gears and chains are less apt to cause damage to the fabric through faulty lubrication; yet, to insure economy and maximum production, their lubricants must also be carefully selected and applied.



Courtesy of Textile Machine Works

Fig. 18—Rear view of the Coulier motion on a full-fashioned machine. Lubrication is maintained by oil-soaked felt in pan 9 below the motion. Careful lubrication of the Coulier cam is necessary to prevent wear and to insure uniform travel.

Cleaning and Oiling of the Jacks

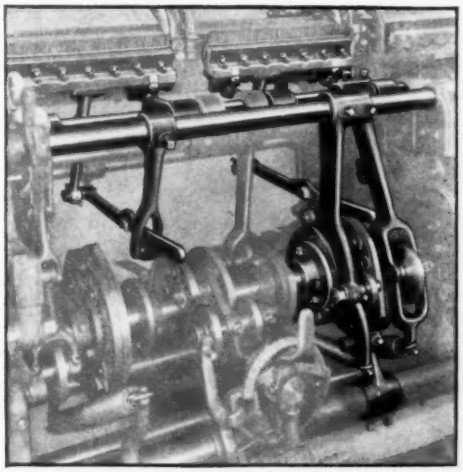
In the full fashioned knitting machine even movement of the jacks has a material effect upon the durability of the sinkers and verge plates. Should jack movement be at all delayed or uneven, considerable trouble may result, especially in regard to broken sinkers. Even movement of the jacks can be assured by careful and regular cleaning and lubrication.

Recommended practice by builders of such machinery is to clean jacks and sinkers with kerosine at least once each month. Re-lubrication, however, should be practiced at least every two weeks, using a highly refined oil which will show the least tendency towards oxidation, which is the basic cause of gum formation.

Circular Knitting Machines

In circular or tubular knitting machines a point where careless selection and application of the lubricant may cause trouble is on the roll take-ups and worm gear attachments which serve to keep the fabric under uniform tension during knitting. For this service a pure stainless knitting oil should always be used in order not only to eliminate excessive loads upon the needles, but as well to prevent gumming. Were the oil to gum and become relatively stiff, the rollers would work sluggishly and abnormal wear would be apt to occur. It is advisable, therefore, to watch such mechanisms carefully, and even though the best grade of oil is used, to remove and rinse them in kerosine about once every month to insure that they are perfectly clean and free from gummed oil or accumulated dust and lint.

To prevent oil spots on the fabrics, needle cylinders and dials on certain of the circular knitting frames must also be oiled carefully. Self-feeding oil cups are sometimes installed on the machines for this purpose, but owing to their positive action, unless promptly turned off whenever the machine is stopped, they will tend to flood the working parts and cause serious oil spots or, even streaks.

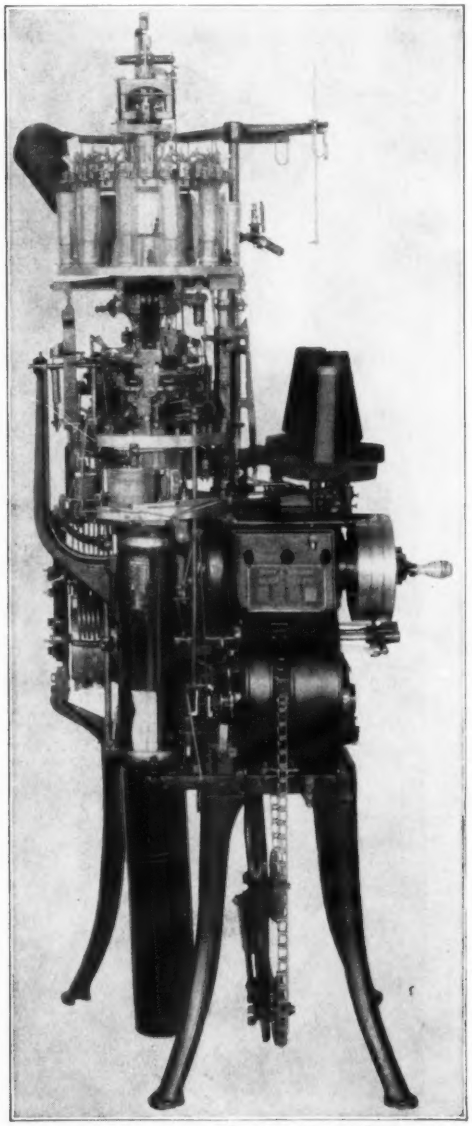


Courtesy of Textile Machine Works

Fig. 19—The needle bar arrangement on a full-fashioned knitting machine.

Application of Lubricants

Knitting machines may be lubricated either by the machine operators themselves or by a mechanic or fixer who has charge of entire plant lubrication. There are advantages and disadvantages pertinent to both methods. The latter is often the more satisfactory unless the individual operators are properly instructed as to the manner in which their machines should be lubricated. Whoever is charged with the responsibility for lubrication should fully understand the machines and their respective parts that require protection, and appreciate the detrimental effects that careless, sloppy or excessive oiling may have upon the knitted fabric. Knitting machines should be lubricated at regular intervals, the frequency to be based on their actual time of operation. Certain manufacturers have prepared some very helpful instructions in this regard.



Courtesy of Scott & Williams, Inc.

Fig. 20—The Scott & Williams circular knitting machine showing intricacy of design, which requires careful lubrication by selected lubricants to protect the parts and prevent oil stains.

The essential point to remember in the lubrication of knitting machines is that the least amount of oil that will adequately lubricate the working parts is the best insurance against the occurrence of oil spots. If, in conjunction with such a policy, the best grade of stainless knitting oil is used wherever there is danger of dripping or splashing, the lubricating problems in the knitting mill should be practically eliminated.

NEEDLE OILS

Needle oils must come in contact both with the thread and the highly polished surfaces of the needles. By reason of this fact (in addition to being specially refined from selected petroleum stocks) they must:

(1) be scourable or readily and completely removed from the goods,
(2) free from any materials which would cause discoloration of the goods during storage, and
(3) show no tendency towards rancidity.

The first two requirements obviously affect the goods, and as needle oils are bound to get on the latter, they should be so prepared as to lend themselves to removal during the scouring process. This requirement has caused the petroleum chemist to study compounding procedure most carefully. Compounding of lubricating oils is a science in itself, requiring most intimate knowledge of fatty materials, their behavior in the presence of water and their ability to go into complete solution with petroleum oils. By selecting materials most resistant to oxidation and perfecting the methods of compounding, some oils of a very high degree of chemical stability have been developed.

Since oxidation of any fatty oil compound in storage or service is indicated by rancidity and a disagreeable odor, it can be seen that improvement of the chemical stability automatically increases the resistance to oxidation. This insures better protection of the needles against rusting or corrosion.

Printed in U. S. A. by
EDGAR C. RUWE CO., INC.
72 Washington St., N. Y. C.

TEXACO LUBRICANTS
FOR
TEXTILE MACHINERY

BEAMING
SLASHING
WEAVING
KNITTING
FINISHING
PRINTING

BEAMERS and WARPERS	
Plain Bearings	
Oil Lubricated	TEXACO Texol-D or Aleph Oil
Grease Lubricated	TEXACO Cup Greases
Ball Bearings	TEXACO Starfak Greases
SLASHER CYLINDER BEARINGS	TEXACO Pinnacle Cylinder Oil or TEXACO Marfaks
GEARS and CHAINS	
Enclosed, high speed	TEXACO Texol-D or Aleph Oil
medium speed	TEXACO Stazons or Thubans
Exposed	TEXACO Crater Compounds
LOOMS	
Crank and Cam Shaft	TEXACO Stazons, TEXACO Texol-E or Altair Oil
Harness and Pick Cams	TEXACO 919 Lubricant S or TEXACO Cup Greases
Dobby and Worsted Heads	TEXACO Stazons, TEXACO Texol-D or Aries Oil
Jacquard Heads	TEXACO Stazons, TEXACO White Oil-B, TEXACO Texol-D or Aleph Oil
KNITTING MACHINES	
Full Fashioned Machines	
Needles and Narrowing Points	TEXACO Needle Oil or White Oil-B
Oscillating Motions	TEXACO Cepheus Oil-C
Pressure Gun Lubrication	TEXACO Stazons
Circular Machines	
Needles and Sinkers	TEXACO Knitting Oil or Spica Oil
Cams and Machine Parts	TEXACO Regal Oil-B or Canopus Oil
Grease Lubrication	TEXACO Cup Grease No. 1 or No. 3
DRYING RANGES	
Can Bearings	
Sharp Oilers	TEXACO Texol-K or TEXACO 1231 Petrolatum
Wick Oil Cups	TEXACO 650-T Mineral Cylinder Oil
Ball or Roller Bearings	TEXACO Marfaks
CALENDER ROLLS	TEXACO Taurak or Hytex Greases
TENTERING FRAMES	
Clip Chains and Pins	TEXACO Texol-K or TEXACO Starfak Grease No. 2
Raceways, high temperature	TEXACO Hytex Grease No. 3 or TEXACO 1231 Petrolatum
PRINTING MACHINES	
Engraved Roll Mandrels	TEXACO Taurak or Hytex Greases
Cylinder Bearings	TEXACO Texols

NOTE — The above chart represents our general recommendations. For any specific type or make of machine, consult your Texaco Lubrication Engineer.

BALL AND ROLLER BEARINGS

Kept truly Anti-friction!
Spinning and twister frames with anti-friction bearings for cylinders, save power, application time, wear, make for more uniform spindle speeds, through proper lubrication.

Close-up of cylinder bearing. This bearing can be kept in perfect order for years by using Texaco Starfak.

THE INSTALLATION of ball and roller bearings makes outstanding improvement in textile machines, but to maintain this improvement, these bearings must be properly lubricated.

Thousands of ball and roller bearings in textile mills are kept truly anti-friction with Texaco Starfak Grease.

Texaco Starfak stays stable over long service periods, resisting oxidation, gum formation, and oil separation.

Reduce the possibility of undue wear and costly shutdowns in your mills. Texaco can help you.

Trained lubrication engineers will aid you to select and apply Texaco Starfak. 2229 Texaco warehouse plants throughout the United States assure prompt delivery. Wire or phone the nearest, or write:

THE TEXAS COMPANY • TEXACO PETROLEUM PRODUCTS • DISTRICT OFFICES

ATLANTA	133 Carnegie Way	HOUSTON	720 San Jacinto Street
BOSTON	20 Providence Street	LOS ANGELES	929 South Broadway
BUFFALO	14 Lafayette Square	MINNEAPOLIS	706 Second Ave., South
BUTTE	Main Street & Broadway	NEW ORLEANS	919 St. Charles Street
CHICAGO	332 So. Michigan Avenue	NEW YORK	205 East 42nd Street
DALLAS	2310 S. Lamar Street	NORFOLK	Olney Rd. & Granby St.
DENVER	910 16th Street	SEATTLE	3rd & Pike Streets

TEXACO

Indian Refining Company, 5 East Market Street, INDIANAPOLIS
The Texas Company of Canada, Ltd., Langman Bldg., Calgary, Alberta, Canada